64475 and 64476

DRAFT

Dilithologic Breccia

1032 and 125 grams

Figure 1: Photo of 64475 (N1). NASA S72-43081. Sample is 9 cm across. This surface is unpitted.

Introduction

These two samples were collected at station 4, Apollo 16, and returned together in doc bag 398.

Their orientation is known from surface photography and the top side of 64475 has numerous micrometeorite craters. They are both "black and white" rocks with veins of dark impact melt rock intruding white cataclastic anorthosite (figures 1 and 2).

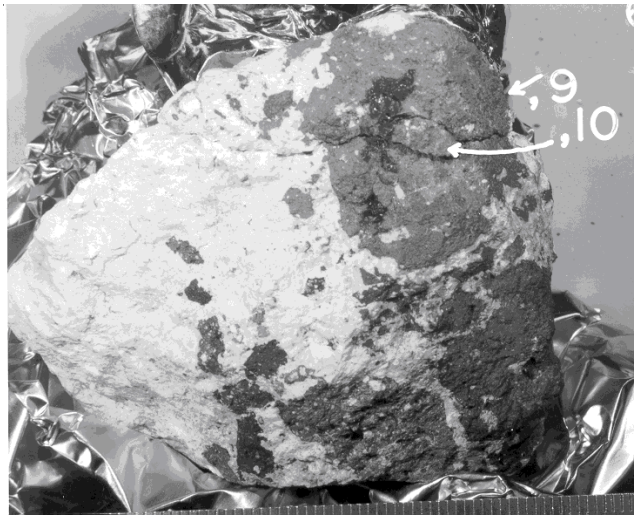


Figure 2: Photo of 64476. Sample is 6 cm across. NASA S93-40241.

Petrography

Ryder and Norman (1980) provide descriptions of 64475 and 64476. Some of the anorthositic clasts in 64475 were studied by McKinley et al. (1983). Anorthositic clasts with coarse-grained cumulus texture and with granulitic texture are described by McKinley et al. (figure 4), but analyses are not given. See thin section photomicrographs in McKinely et al.

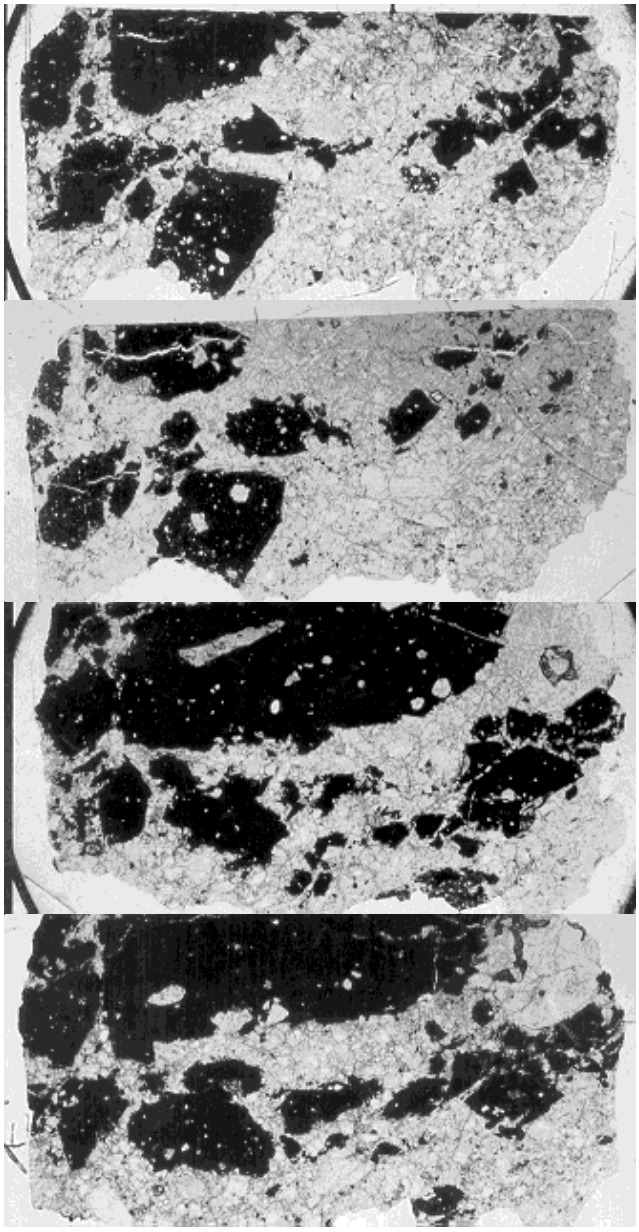


Figure 3: Photomicrographs of 4 thin sections of 64475 (,64 ,65 ,60 and ,61). 2.5 cm across.

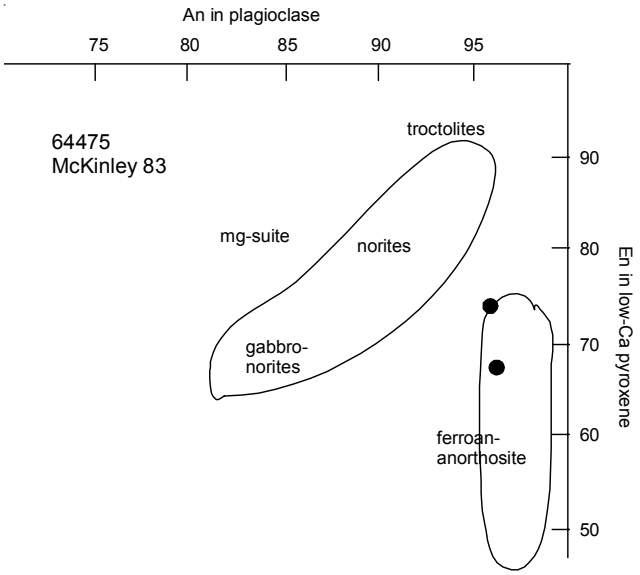


Figure 4: Composition of plagioclase and pyroxene in anorthositic portion of 64475 (McKinley et al. 1983).

Hunter and Taylor (1981) reported "rust" and schreibersite in both 64475 and 64476.

Wilshire and Moore (1974) suggest that the dark phase was originally the matrix of the rock, but that at a later time portions of the white cataclastic anorthosite were mobilized giving the appearance that the white material is invading the dark (figure 2).

Chemistry

Scoon (1974) analyzed a chip containing both lithologies and McKinley et al. (1983) provided trace element analysis of the melt rock litholog (table 1). 64475 has very high Ni, Ir and Au content. Clark and Keith (1973) determined bulk U, Th and K in 64476 (whole sample). Moore and Lewis (1976) reported 55 ppm carbon and 92 ppm nitrogen.

The analyses of the 'melt rock' lithology is fairly common among various Apollo 16 dilithologic breccias (McKinley et al. 1983; James et al. 1984).

Cosmogenic isotopes and exposure ages

Clark and Keith (1973) determined the cosmic ray induced activity of 64476 as ^{26}Al = 132 dpm/kg., ^{22}Na = 48 dpm/kg. and ^{46}Sc = 1.5 dpm/kg. Bogard and Gibson (1975) reported a young cosmic ray exposure age of around 1 m.y., but within accuracy, the same as other samples from South Ray Crater.

Other Studies

Stephenson et al. (1974) attempted to determine the remanent magnetization of chips of 64475.
Bogard and Gibson (1975) reported the rare gas composition, noting that 64475 was loaded with solar wind gases.

Processing

A slab was cut from 64475 (figures 6 and 7) and a column was cut from the slab (figure 8).

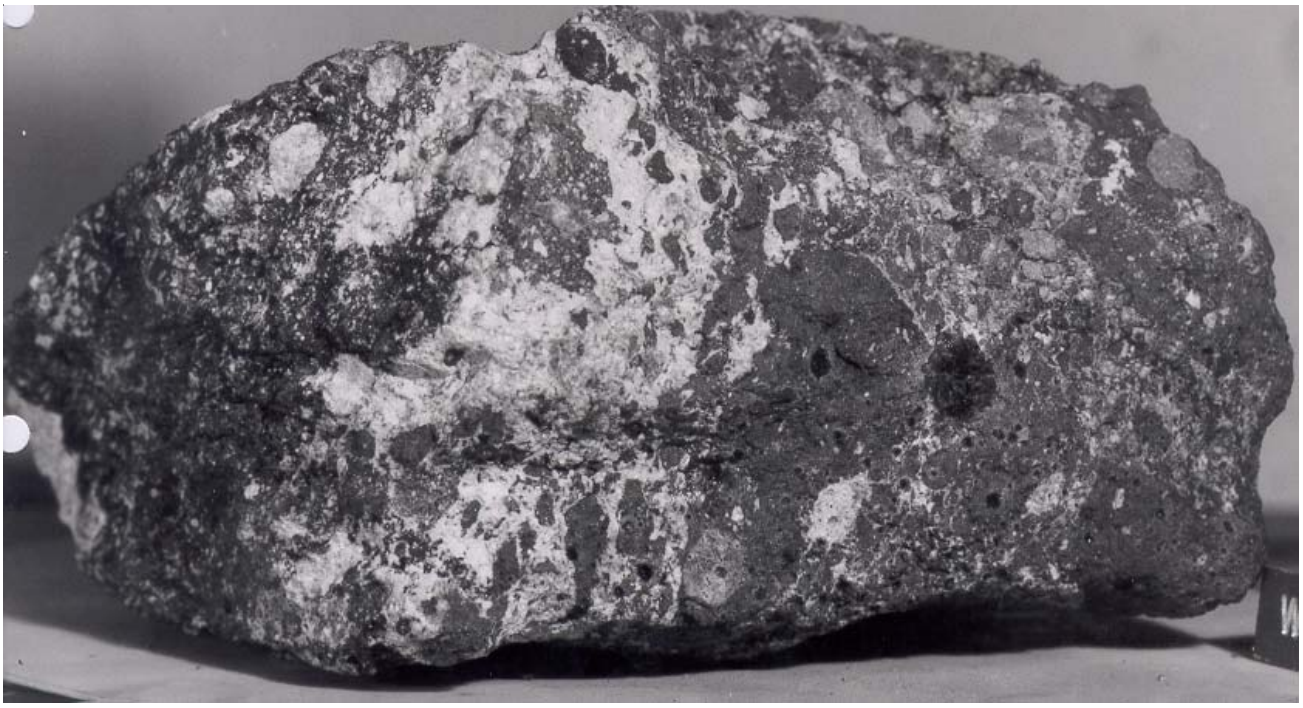


Figure 5: Photo of 64475 (S1). NASA S72-43086. Note numerous mirometeorite pits this surface, inclusing large one. Cube is 1 cm.

Table 2. Chemical composition of 64475.

reference	McKinley 84				Scoon 74		Clark73	
weight							125 g	
SiO2 %			*47.1*	*(b)*	44.81	(c)		
TiO2	0.8	(a)	*0.84*	*(b)*	0.54	(c)		
Al2O3	21.2	(a)	*22.9*	*(b)*	28.32	(c)		
FeO	8	(a)	*5.7*	*(b)*	4.64	(c)		
MnO	0.082	(a)	*0.08*	*(b)*	0.06	(c)		
MgO	11.1	(a)	*9.4*	*(b)*	5.61	(c)		
CaO	13.3	(a)	*13*	*(b)*	15.88	(c)		
Na2O	0.515	(a)	*0.6*	*(b)*	0.49	(c)		
K2O	0.16	(a)	*0.2*	*(b)*	0.12	(c)	0.08	(c)
P2O5			*0.2*	*(b)*	0.15	(c)		
S %								
sum								
Sc ppm	10.6	(a)						
V	33	(a)						
Cr	1115	(a)						
Co	65	(a)						
Ni	*1080*	(a)						
Cu								
Zn								
Ga								
Ge ppb								
As								
Se								
Rb								
Sr								
Y								
Zr								
Nb								
Mo								
Ru								
Rh								
Pd ppb								
Ag ppb								
Cd ppb								
In ppb								
Sn ppb								
Sb ppb								
Te ppb								
Cs ppm								
Ba	290	(a)						
La	27.8	(a)						
Ce	69	(a)						
Pr								
Nd	40	(a)						
Sm	13.2	(a)						
Eu	1.58	(a)						
Gd								
Tb	2.43	(a)						
Dy	14.7	(a)						
Ho								
Er								
Tm								
Yb	8.37	(a)						
Lu	1.21	(a)						
Hf	8.6	(a)						
Ta	1.2	(a)						
W ppb								
Re ppb								
Os ppb								
Ir ppb	*30*	(a)						
Pt ppb								
Au ppb	*30*	(a)						
Th ppm	4.1	(a)					1.19	(c)
U ppm	1.2	(a)					0.31	(c)

technique: (a) INNA, (b) strange and uncertain, (c) wet chem. , (d) radiation counting

Figure 6: Photo of sawn surface of 64475,1. Sample is 10 cm. NASA S80-30589.

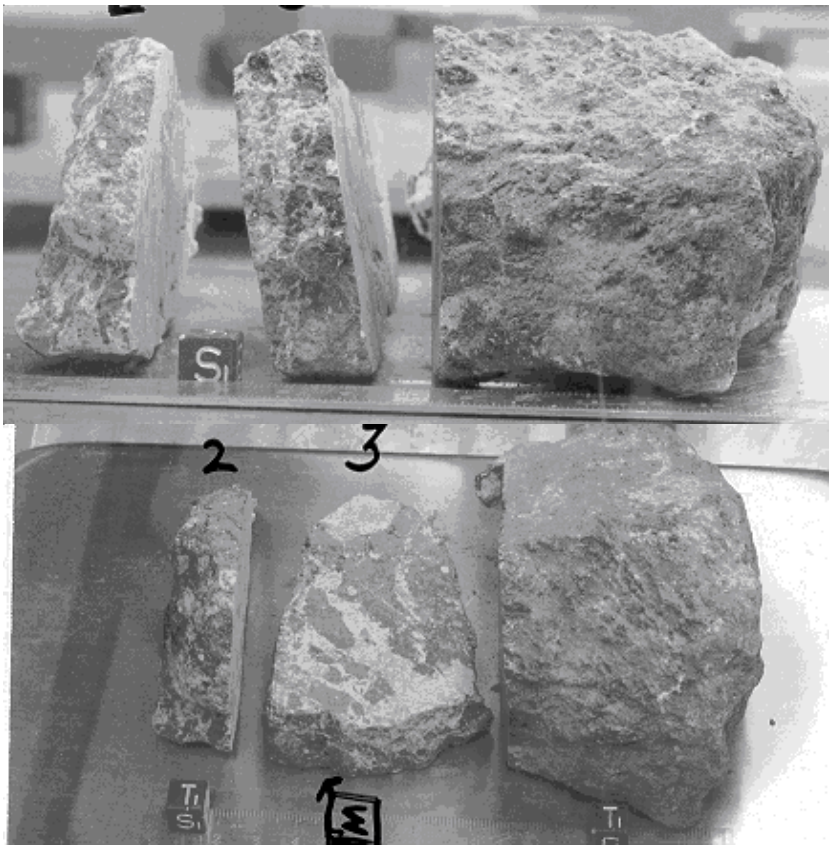


Figure 7: Photos from 'data pack' showing processing of 64475.

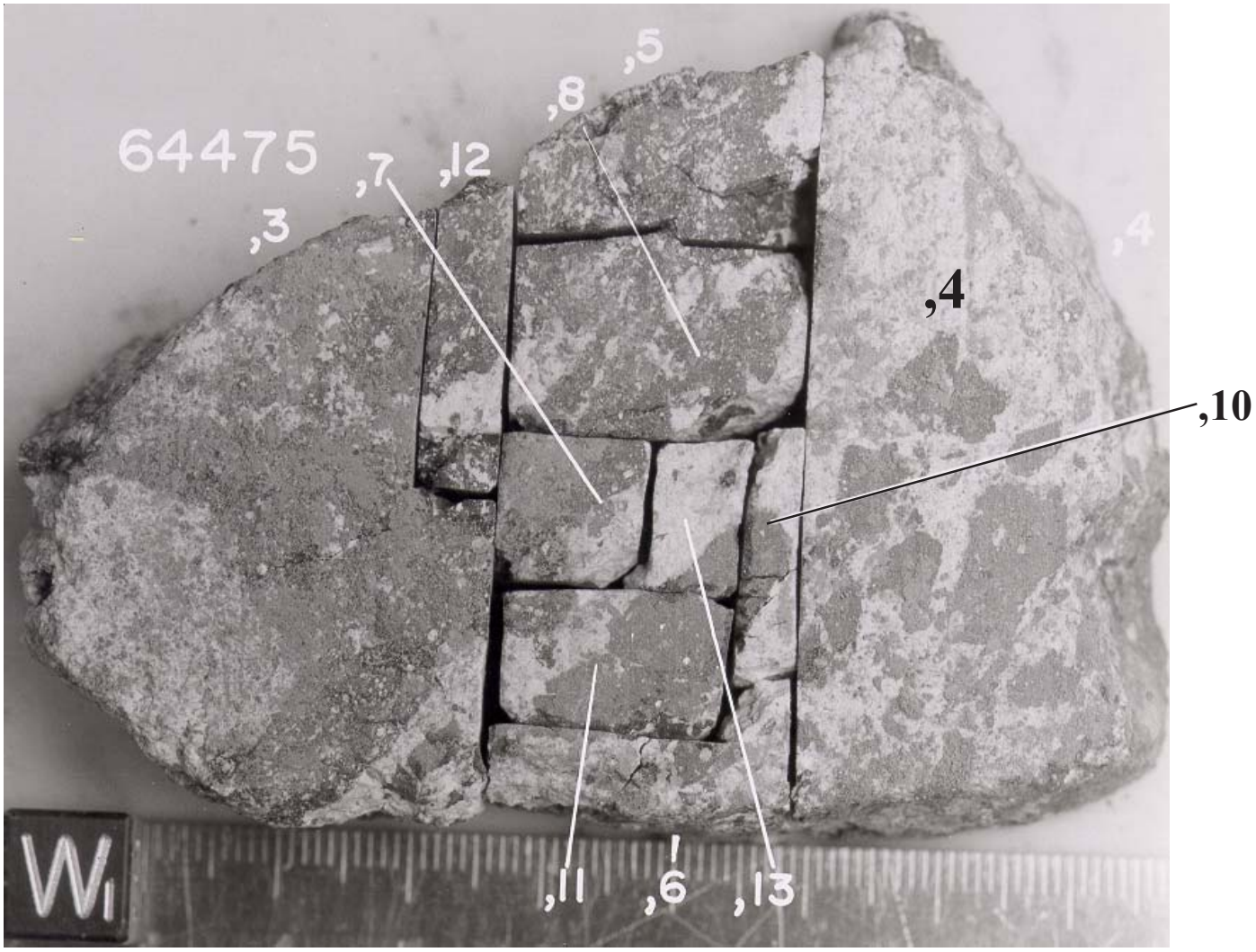
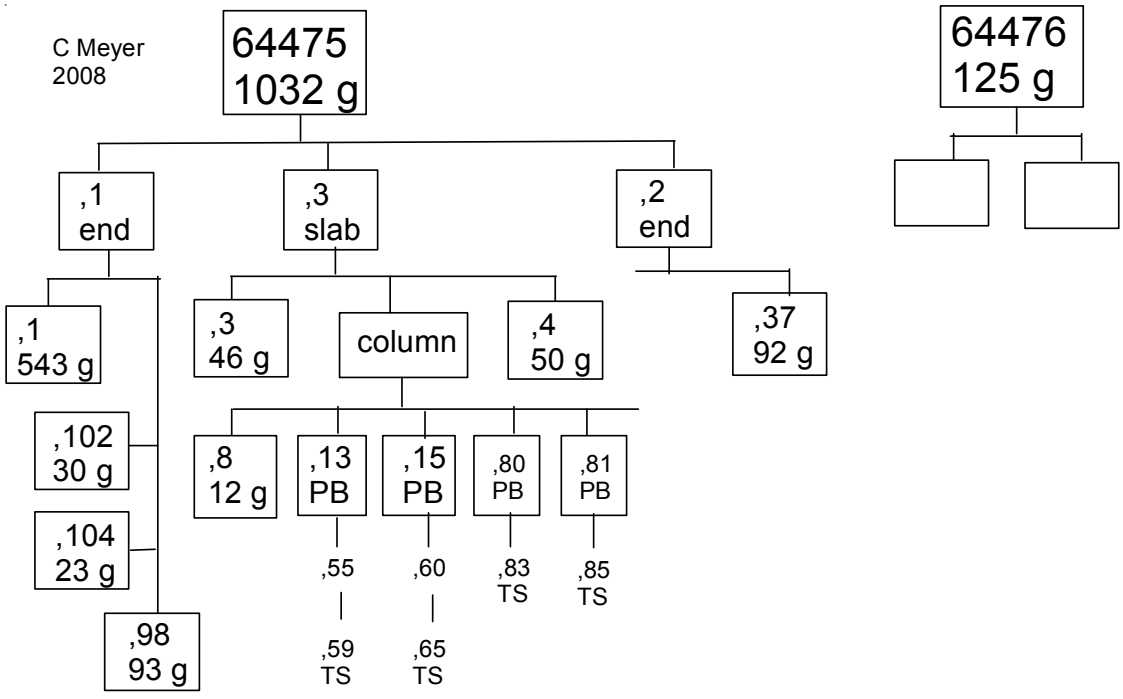


Figure 8: Photo of slab and column cut from 64475. NASA S73-28695. Cube is 1 cm.



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